Prevalence of Anemia among Adolescent Girls (10-19 years) in Urban Slums of Thiruvananthapuram Corporation

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ABSTRACT

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Background: Adolescent represents a window of opportunity to prepare for a healthy adult life. Anemia is the most important nutritional deficiency during this period. Mild to moderate anemia usually appear in the early life and if proper intervention is given in adolescent age, majority of maternal and perinatal mortalities and morbidities can be prevented. This study was conducted to find out the prevalence of anemia among adolescent girls in slums where standard of living as well as the knowledge about anemia is very poor.

Objectives: To find out the prevalence of anemia among adolescent girls (10 -19 years) residing in urban slums of Thiruvananthapuram corporation and to assess the knowledge about anemia among adolescent girls.

Methods: A cross sectional study was conducted among 150 adolescent girls of age 10 to 19 years in 10 randomly selected urban slums of Thiruvananthapuram Corporation. According to WHO criteria anemia is found to exist in adolescent girls when hemoglobin value less than 12g/dl. HemoCue method was used for hemoglobin estimation.

Results: It was found that the prevalence of anemia among adolescent girls was 48%. 76% had mild anemia, 21% had moderate and 3% had severe anemia. Adequate knowledge about anemia was there in 20.3% in 10 to 14 age group and 34.2% in the 15 to 19 age group. Significant association (χ^2=4.33, p<0.05) was obtained between anemia and knowledge about anemia.

Conclusion: The prevalence of anemia among adolescent girls living in urban slums of Thiruvananthapuram city was found to be 48% and there is a significant association between prevalence of anemia and knowledge regarding anemia. The study shows anemia is a major public health problem among adolescent girls living in urban slums of Kerala, the south Indian state. Increasing awareness through health education programs, screening for disease and timely interventions like Iron and folic acid supplementation and de-worming at school levels may help in tackling this menace.

Keywords: Adolescent, Anemia, Hemoglobin, Prevalence, Knowledge

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INTRODUCTION

Anemia is a condition where there is a reduction in oxygen transporting capacity of blood, usually due to a reduction in total circulating red cell masses. This is reflected by subnormal hemocrit and hemoglobin concentration. Anemia can be due to blood loss, increased rate of destruction of RBCs (hemolytic anemia), infection(malaria), impaired red cell production which include deficient hemoglobin synthesis caused by iron deficiency and unknown causes. Nutritional anemia is the most common anemia in the world. Among nutritional anemia, iron deficiency anemia is the most important one. Causes of iron deficiency anemia include blood loss, increased requirement during childhood and reproductive period in females, impaired absorption and inadequate intake.

As per the World Health Organization, adolescence age has been defined as the period between 10 to 19 years.[1] This period is characterized by rapid physical, psychological and cognitive development and this phase is considered as the second phase of growth and development. There is a misbelief that adolescents are healthy and less vulnerable for disease and so they do not require any health services. Adolescents were not mentioned in mother and child health program in early nineties in India. However, increased physical activity, poor eating habits, menstrual abnormalities and early pregnancy are contributing to poor nutrition in adolescents. All these predispose to anemia. Anemia will reappear during adolescent period after early childhood. Both boys and girls are affected by iron deficiency anemia but it is more evident in girls because of menstrual blood loss.[2]

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WHO estimates that anemia prevalence among adolescent girl is 27% in developing countries and 6% in developed countries. International Centre for Research for Women (ICRW) studies documents that prevalence of anemia is 55% in India, 42% in Nepal, 32% in Cameron and 48% in Guatemala. In India, more than half of pregnant women i.e. 13 million are anemic. Of these, 13% are severely anemic (Hb <7g/dl).[3,4,5]

According to National Family Health Survey (NFHS II) prevalence of anemia among 15-49 years' women was 53% in rural and 45.7% in urban area.[6]

Adverse effects of iron deficiency anemia include poor mental and psychomotor functions, growth retardation, poor physical capacity and recurrent infections. Anemia during pregnancy can result in pre-eclampsia, recurrent infection, heart failure, preterm labor, postpartum hemorrhage, low birth weight babies, intrauterine growth retardation and death. Adolescence represents a period of transition between childhood and adulthood. This unique phase in human life is represented by rapid growth and perhaps the last chance to grow. Correct and timely intervention during adolescent period can help in preventing unnecessary mortalities and morbidities in future.

MATERIALS AND METHODS

A cross sectional study was conducted in urban slums of Thiruvananthapuram Corporation. Adolescent girls 10-19 years were selected for the study. Those adolescent girls who were suffering from chronic diseases, those who were on medication like iron and folic acid and those who were on medicines which suppress bone marrow and those who were pregnant were excluded from the study. Sample size was calculated using $4pq/l^2$ where p is prevalence of anemia among adolescent girls and q is 100-p. In this study p = 63.8% which was taken from the study conducted by Metha MN.[7] Considering an alpha error of 5%, beta error of 20% and with design effect two, sample size was fixed to 150. Among 112 urban slums in Thiruvananthapuram Corporation, 10 slums were randomly selected using Table of Random numbers. From these randomly selected slums, 15 adolescent girls from each slum was selected randomly. Variables studied were age, religion, income, educational status of study participants and their parents, occupational status of head of family, menstrual history. Outcome variable was the prevalence of anemia which was assessed by measuring hemoglobin level. WHO definition was used to define anemia in this study. According to WHO, Anemia is considered to exist when Hemoglobin level is below 7.5 mmol/L (12 g/dL) in non-pregnant women & children in age range of 6 - 14 years.[8] For men to be anemic, Hemoglobin below 8.1 mmol/L (13 g/dL). Therefore, in the present study, anemia is said to exist in adolescent girl if the hemoglobin level is below 12g/dl. Degree of anemia was assessed as mild anemia (Hb level 10.0-11.9g/dl), moderate anemia (7-9.9g/dl) and severe anemia (<7g/dl). In this study hemoglobin estimation was done using HemoCue method. This method is accepted for field surveys and was used in National Family Health Survey in India.[6] HemoCue Hb 201+ analyzer with HemoCue Hb 201 micro cuvettes was used in this study. The biochemical Principal: It is a modified azide methemoglobin reaction and this was described by Vanzetti et al in 1966.[9] Reagents present are as follows: 40% w/w sodium deoxy cholate, 18% w/w sodium azide, 20% w/w sodium nitrite and 22% w/w non-reactive ingredients. The erythrocyte membrane is disintegrated by sodium deoxy cholate, releasing the hemoglobin. Sodium nitrite converts the hemoglobin iron from the ferrous to the ferric state to form methemoglobin, which then combines with azide to form azide methemoglobin. The absorbance is measured at two wave lengths (570nm and 880nm) in order to compensate for turbidity in the sample.

Ethical Clearance was obtained from Human Ethical Committee, Medical College, Thiruvananthapuram and informed consent was obtained from study participant and from their guardian before starting the study.

Procedure for Hb estimation: Middle of left finger was cleaned with spirt and cotton. The fingertip punctured was using a sterile lancet. The first two drops of blood were wiped out to make sure that the sample of blood used for analysis consisted of fresh capillary blood. Light pressure was applied towards the fingertip until another drop of blood appeared which was collected in a micro cuvette. Blood filled micro cuvette was placed in the HemoCue analyzer. Hemoglobin value is read directly from the analyzer within a minute.

A structured questionnaire was used to collect information regarding demographic variable and knowledge of anemia and its complications. Since the knowledge level was different for 10-14 and 15-19 years as most of the girls in latter group were in high school and above, two sets of questionnaire were used to assess knowledge among 10-14 years and 15-19 years. Questions for assessing knowledge were scored and were categorized as adequate and inadequate knowledge. Maximum score for 10-14 years was 9 and 15 – 19 years was 11.

RESULTS

The mean age of the 150 adolescent girls studied was found to be 12.5 years (SD 1.831). Equal numbers of adolescent girls (24% each) were there in 12 to 13 and 14 to 15 age group respectively. Remaining 22% were 16 to 17, 17% were 10 to 11 and 13% were 18 to 19 age group. Regarding the religious believes 84% were Hindus, 14% Christians and 2% Muslims. 98.7% belongs to families living below poverty line. 49% of adolescent girls were in high school, 33% in middle school, 11% in +1/+2, 4% in degree and only one girl was illiterate. Regarding the educational status of

Table 1. Demographic characteristics of study participants (N=150)

Age group	Frequency	Percentage
10 – 11	25	17
12 -13	36	24
14 – 15	36	24
16 – 17	33	22
18 – 19	20	13
Mean age 12.5 SD1.831		
Religion		
Hindu	126	84
Christian	21	14
Muslim	3	2
Poverty line		
Above	2	1.3
Below	148	98.7
Educational status of adolescent girls		
Iliterate	1	1
Literate/Primary school	4	2
Middle school	49	33
High school	73	49
Plus one/plus two	17	11
Degree	6	4
Educational status of father		
Illiterate	11	7
Literate/primary school	48	32
Middle school	46	31
High school	43	29
Pre degree/Degree	2	1
Educational status of mother		
Illiterate	17	11
Literate/primary school	22	15
Middle school	46	31
High school	59	39
Pre degree/Degree	6	4
Occupational status of head of family		
Unemployed	1	0.7
Unskilled	118	79
Semiskilled	20	13
Skilled	0	0
Shop/clerical	9	6
Professional	2	1.3
Attainment of menarche		
Attained	100	66.7
Not attained	50	33.3
Mean age of menarche 12.38 (Standard deviation 1.062)		

Table 2. Prevalence of anemia

Anemia	Frequency	Percentage
Present	72	48
Absent	78	52
Total	150	100

parents, 93% of fathers and 89% mothers were literate and above literate. 11% mothers and 7% fathers were illiterate. Occupational status of head of family revealed that 79% were unskilled labours, 13% were semiskilled workers, 6% were shop keepers and 1.3% was professionals. Regarding the menstruation history, 66.7% had attained menarche and 33% had not. Mean age of menarche was 12.38 years (SD 1.062) (Table 1).

Table 3. Degree of Anemia

Degree of anemia	Frequency	Percentage
Mild	55	76
Moderate	15	21
Severe	2	3
Total	72	100

In this study, prevalence of anemia was 48% (Table 2) of this, three fourth (76%) were mildly anemic, 21% moderately anemic and 3% were severely anemic (Table 3).

Table 4. Age wise distribution of Anemia

Age group	Frequency	Prevalence of anemia (%)	Degree of anemia		
			Mild	Moderate	Severe
10 -12	25	34.6	21(38.2%)	3(20%)	1(50%)
13 – 15	21	29.1	15(27.3%)	6(40%)	0(0)
16 – 19	26	36.3	19(34.5%)	6(40%)	1(50%)
Total	72	100	55(100%)	15(100%)	2(100%)

Table 4 shows the age wise distribution of Prevalence of anemia. High prevalence (36.3%) was found among 16 – 19 age group followed by 34.6% in 10 – 12 years and 29.1% in 13 -15 years. Mild anemia was 38.2%, 27.3% and 34.5% in 10 -12, 13-15 and 16 -19 age group respectively. Moderate anemia was 40% each in 13 -15 and 16-19 age group. But it was 20% in 10-12 age

Table 5. Prevalence of anemia according to the educational status of study population

Educational status	Anemic	Non anemic	Total
Illiterate	0(0%)	1(100%)	1(100%)
Literate/Primary school	2(50%)	2(50%)	4(100%)
Middle school	28(57.1%)	21(42.9%)	49(100%)
High school	32(43.8%)	41(56.2%)	73(100%)
Plus one& two	8(47.1%)	9(52.9%)	17(100%)
Degree	2(33.3%)	4(66.7%)	6(100%)
Total	72	78	150

Table 6. Knowledge about Anemia

Age group	Level of knowledge		Total
	Adequate	Inadequate	
10 – 14	15(20.3%)	59(79.7%)	74
15 – 19	26(43.2%)	50(65.8%)	76
Total	41	109	150

group. Severe anemia was found in one girl in 10 to 12 age group and one in 16 to 19 age groups. Anemia was high (57.1%) among adolescents girls in middle school followed by plus one and plus two and high school (Table 5).

Table 6 depicts the knowledge regarding anemia among adolescent girls. One-fifth (20.3%) of the study participants of 10 to 14 years had adequate knowledge about anemia and this was more (34.2%) in 15 to 19 age group.

Table 7. Relationship between Knowledge and Anemia

Level of knowledge	Anemia present	Anemia absent	Chi-square value
Adequate	14	27	4.33 df=1
Inadequate	58	51	P<0.05
Total	72	78	

df=degree of freedom

Results of test of association is shown in Table 7. Significant association was obtained between prevalence of anemia and knowledge regarding anemia (p<0.05).

DISCUSSION

This was a cross sectional study conducted in urban slums of Thiruvananthapuram Corporation, which revealed a Prevalence of anemia of 48% among 10 to 19 years' adolescent girls. A similar finding was observed in a study conducted by Agarwal in which a prevalence of 47.6% was documented in urban slums of North East Delhi.[10] Another study conducted in rural and urban slums of Hyderabad found that prevalence of anemia was 51.2% and 49.8% respectively.[11] Kapoor et al conducted a study in school in Delhi observed a prevalence of 50.8%.[12] Other studies obtained higher prevalence than this present study. Chaturvedi et al conducted a study in rural Rajasthan which recorded a prevalence of 73.7%.[13] Metha MN documented a prevalence of 63.8% in Bombay slums [7]. Study by Seshadri recorded a prevalence of 63%, 54% and 63% in three villages in Bharuch district of Gujarat.[14] 81.8% was the prevalence obtained in slums

of Ahmedabad city by Verma et al.[15] Bulliyy et al found 96.5% prevalence of anemia among non-school going adolescent girls in three district of Orissa.[16] Degree of anemia was assessed using WHO criteria in this study and mild anemia was 76%. Other studies moderate and severe anemias were more prevalent than this present study. Metha M N document 36.6% mild anemia, 22.4% moderate anemia and 4.8% severe anemia.[7] A study conducted by Jolly Rajaratnam et al in rural Tamil Nadu reported mild anemia 36.5%, moderate anemia 6.3% and severe anemia 2.1%.[17] A study conducted in Orissa documented 45.2%, 46.9% and 4.4% mild, moderate and severe anemia among non-school going adolescent girls.[16]

CONCLUSION

The prevalence of anemia among adolescent girls living in urban slums of Thiruvananthapuram city was found to be 48% and there is a significant association between prevalence of anemia and knowledge regarding anemia. The study shows anemia is a major public health problem among adolescent girls living in urban slums of Kerala, the south Indian state. Increasing awareness through health education programs, screening for disease and timely interventions like Iron and folic acid supplementation and de-worming at school levels may help in tackling this menace.

END NOTE

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